Session 502

Wrapping Mac OS APIs Into Java Beans

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Welcome!

- New Java Frameworks Available Today
  - Java Speech Synthesis
  - Java Speech Recognition
  - Java Spell Checking
- These API are FREE for your use and available as sample code from Apple's Java Developer website

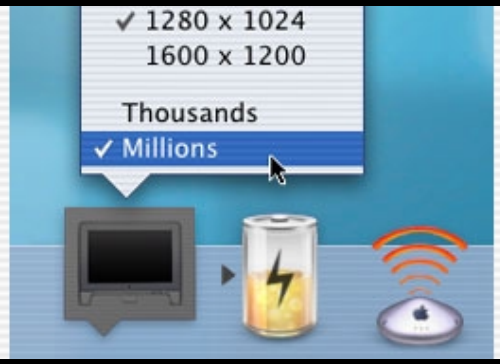
Background Information

- Speech Synthesis and Speech Recognition
  - High-level overview today
    - Please attend the technical sessions on these technologies later in the week
    - On the Web, you may find more information at:
      - http://developer.apple.com/techpubs/macosx
- Java Specification
  - We assume sufficient knowledge of Java in the audience

What are Java Beans?

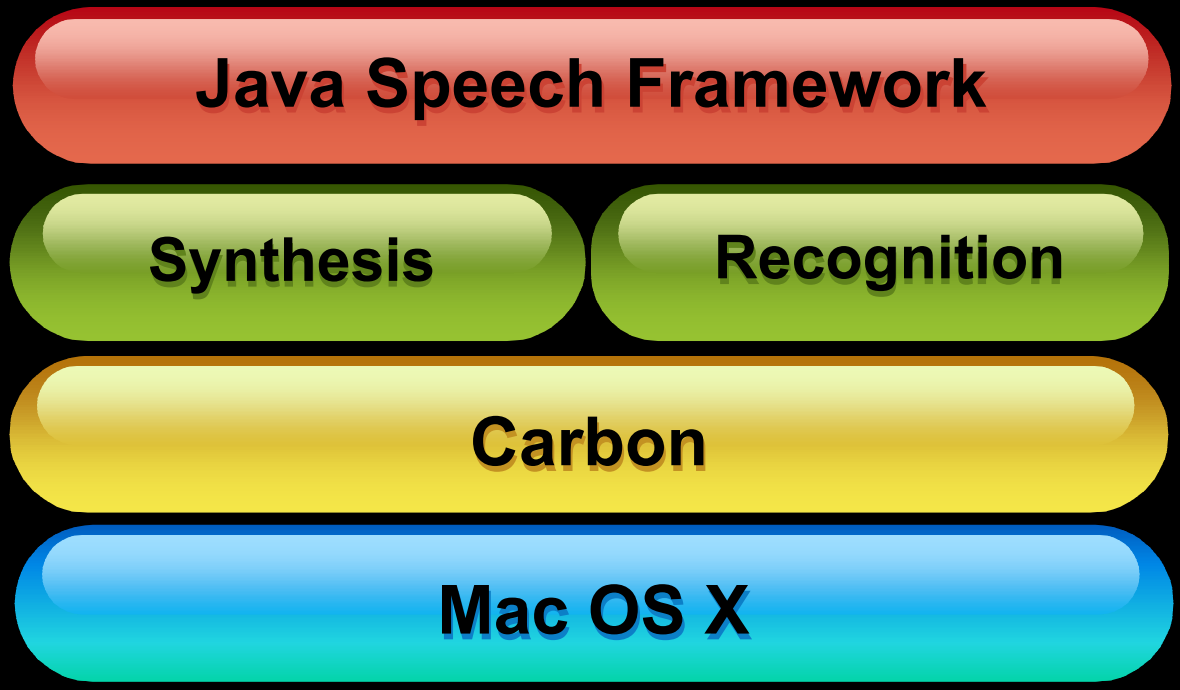
- Industry standard for building and sharing amongst developers visual and non-visual Java “components”
  - For use in Java Tools, Java Applications, and Java Applets
    - The frameworks we discuss today comply with the Java Beans specification
- Technically…
  - Java Beans have “properties” and generate as well as listen for “events”
  - The Java Beans specification defines methods to provide “editors and customizers” for complex properties
- Part of Mac OS X J2SE Implementation

Java Speech Framework



Java Speech Framework

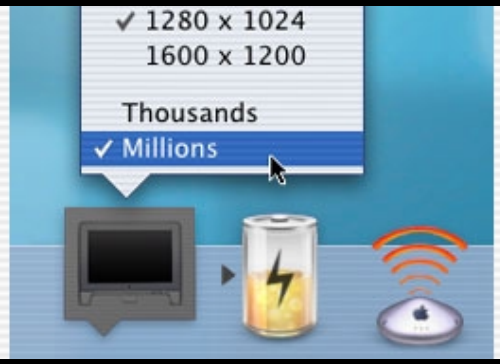
- The Java Speech Framework is a set of Java API which provide access to the Speech Synthesis and Speech Recognition frameworks on Mac OS X



Differences Between API

- Java Speech API
  - Object based in Java
  - Provides programmatic as well as Java Beans based access
  - Provides high level access
  - Available on Mac OS X only
- Carbon Speech API
  - Procedural based in “C”
  - Provides programmatic access only
  - Provides very detailed access
  - Available in Carbon on Mac OS 7.5 and beyond

Java Speech Synthesis



Java Speech Synthesis

- Converts Java Strings to Speech
- Provides ~99% coverage of Carbon Speech Synthesis functionality
- Architecture Neutral
  - Runtime is compatible with all known Java UI frameworks (Swing, AWT, IFC, Cocoa, etc.)
    - Extensible **ThreadTaskHandler** class provides easy integration of Speech callback thread and UI threads
- Provides Java Beans and a customized property editor for tight integration with Java visual IDEs

Java Speech Synthesis API

- Package com.apple.speech.synthesis
  - Class: Synthesizer
    - Main speech synthesis class which provides API to setup the channel and the Voice to use when speaking text
    - You typically use this as a Java Bean to attach event listeners and modify its properties
  - Class: Voice
    - Allows you to vary attributes that effect the way spoken text sounds, such as the rate and pitch of the speaker
    - Provides access to all built in Mac OS Voices
    - You typically use this as a Java Bean and modify its properties via the property editor

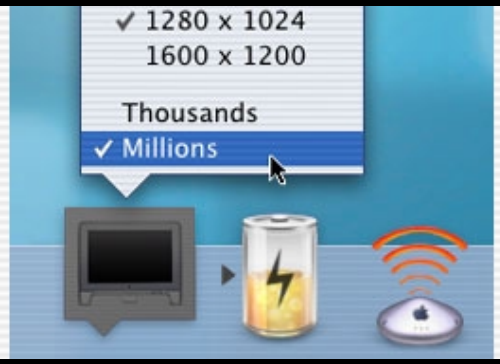
Java Speech Synthesis Events

- Bean com.apple.speech.synthesis.Synthesizer
  - Event: Word
    - Signals that synthesis of an individual word (amongst one or more words within the given text) is about to begin
  - Event: Sync
    - Signals when a synchronization command embedded in the text being spoken is encountered
  - Event: Phoneme
    - Signaled before the synthesis of a phoneme

Java Speech Synthesis Events

- Events Continued…
  - Event: Error
    - Signals when errors contained within embedded commands of the text to be spoken are encountered before being processed
  - Event: Start
    - Signals when speech synthesis on the given synthesizer has started via the Synthesizer's Start() API
  - Event: Stop
    - Signals when speech synthesis has been stopped via the Synthesizer's Stop() API call
  - Event: Done
    - Signals that the system has completed the voice synthesis of the given text

Speech Synthesis DEMO



Java Speech Recognition

Java Speech Recognition

- Recognizes spoken language contained in a Language Model
- Provides ~70% coverage of Carbon Speech Recognition functionality
- Architecture Neutral
  - Runtime is compatible with all known Java UI frameworks (Swing, AWT, IFC, Cocoa, etc.)
    - Extensible **ThreadTaskHandler** class provides easy integration of Speech callback thread and UI threads
- Provides Java Beans and a customized property editor for tight integration with Java visual IDEs

Java Speech Recognition API

- Package com.apple.speech.recognition
  - Class: Recognizer
    - Key class for setting up, starting, stopping, and listening for events of speech recognition
    - This is typically used as a Java Bean
  - Class: LanguageModel
    - Contains the models, paths, words and phrases the recognizer will listen for

Java Speech Recognition Events

- Bean com.apple.speech.recognition.Recognizer
  - Event: Unrecognized
    - Signals that speech, though detected and completed, was not recognized within the context of the given LanguageModel
  - Event: Detected
    - Signals that speech has been detected and is being listened to by the recognizer
  - Event: Done
    - Signals that recognition of speech for the given LanguageModel has been detected

The Language Model and Editor

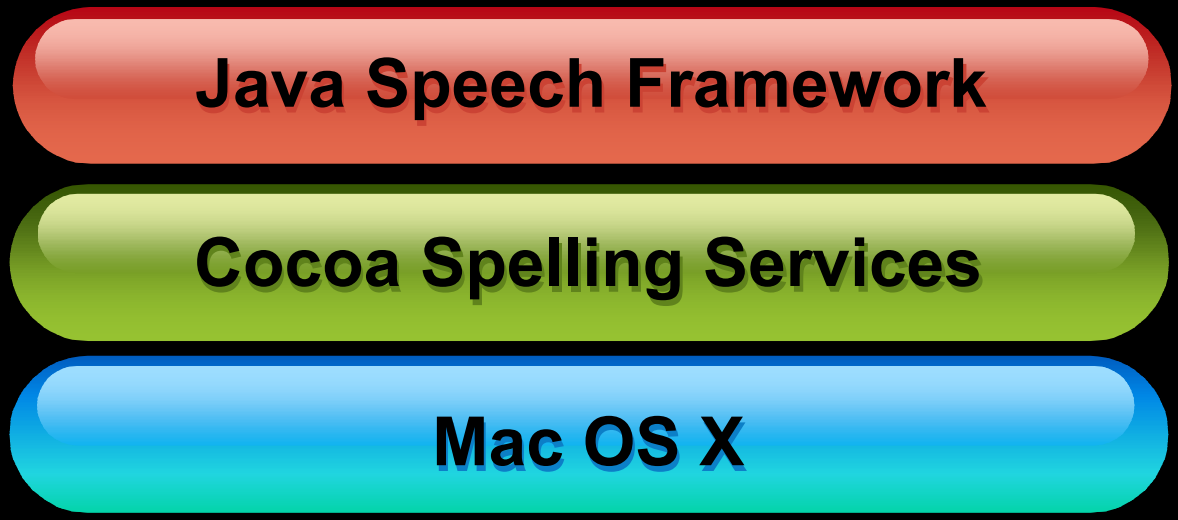
- The Language Model is a graph of Model, Path, Phrase (single and multiple words), and OR objects
  - **<TopLM> = <call> <person> | schedule meeting with <person> | view today's schedule;**
  - **<call> = call | phone | dial;**
  - **<person> = Arlo | Brent | Matt | my wife;**

Speech Recognition DEMO

Java Spelling Framework

Java Spelling Framework

- The Java Spelling Framework is a set of Java API which provide access to the Spell Checker on Mac OS X



Java Spelling

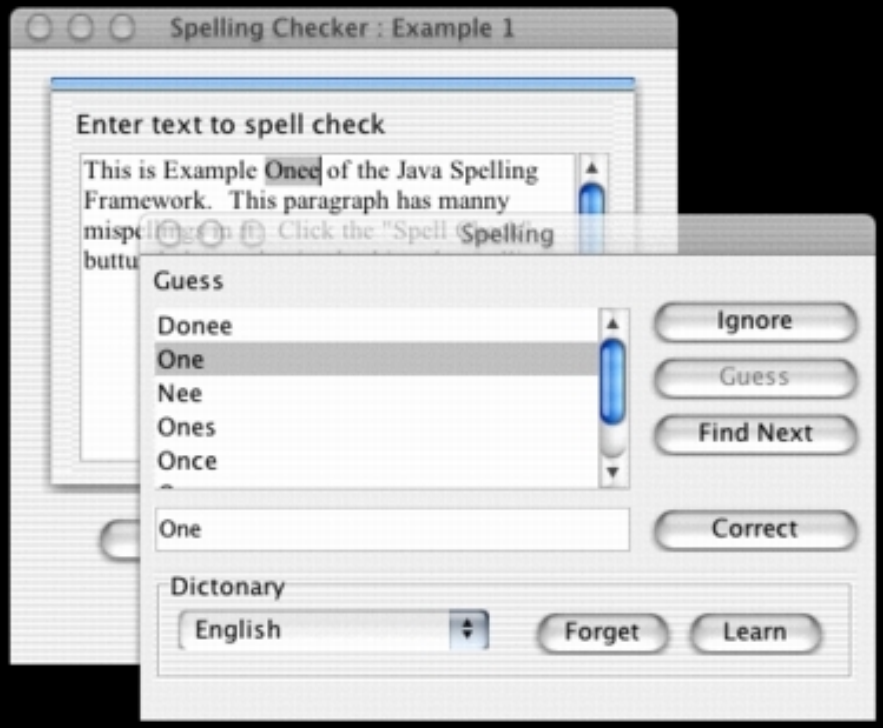
- Provides three levels of usage
  - Simple API to check spelling, suggest corrections, and modify the system dictionary
  - Complete integration with all Swing JTextComponent derived text widgets
  - Abstraction for integrating with non-Swing text components

Java Spelling Framework API

- Package com.apple.spell
  - Class: SpellingChecker
    - The key class to find one or all misspelled words within a given String for a particular language
  - Class: MisspelledWord
    - Instances of this class are returned by the SpellingChecker for words in a String that were misspelled. This class provides API to message the Spelling Checker to learn the misspelled word as a correctly spelled word
  - Class: Word
    - Parent class of MisspelledWord, this class includes API to inform the SpellingChecker to treat the given Word as a misspelled word for the given language

Java Spelling Framework UI

- The Spelling Framework provides a default user interface in Swing

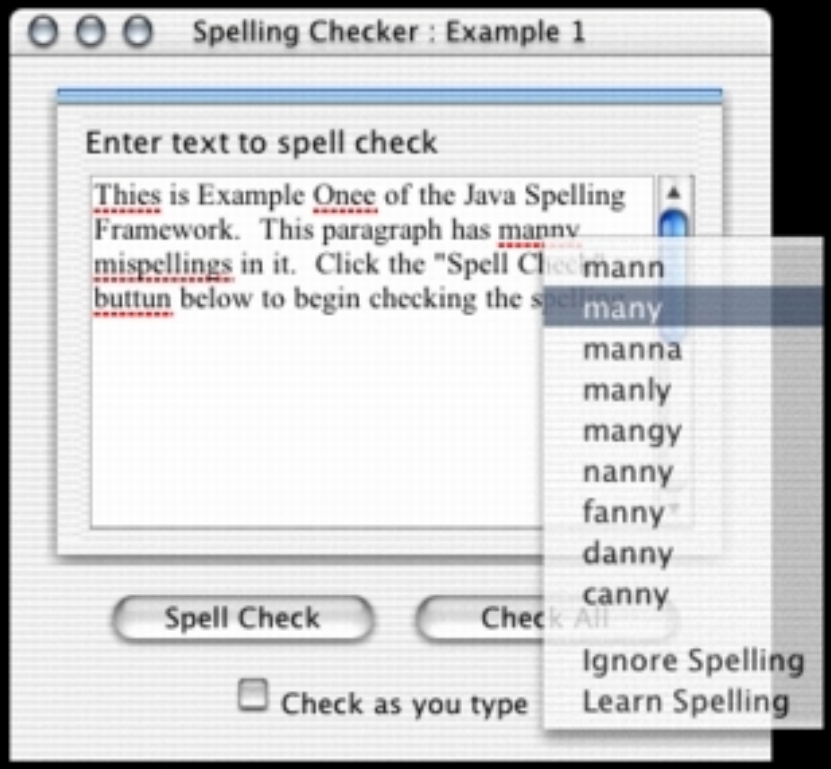


Easy to use API

```
JTextComponentDriver driver =
        new JTextComponentDriver();
driver.checkSpelling(myEditorPane);
```

Java Spelling Framework UI

- The framework also provides inline popup spell checking and realtime spellchecking



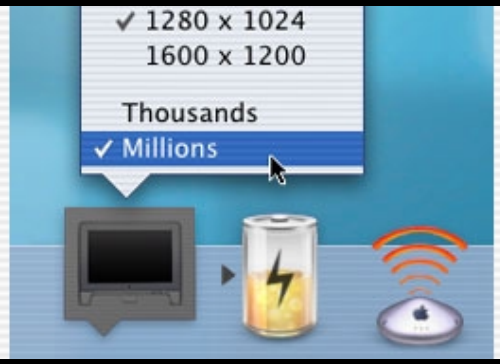
Java Spelling Framework UI API

- Package com.apple.spell.ui
  - Class: SpellingPanel
    - Java Bean to provide a UI the user may interact with to correct the misspellings in a document
  - Class: JTextComponentDriver
    - Class to drive access to a JTextComponent's document and UI feedback to the user based upon events generated by the SpellingPanel
      - For example, this causes a misspelled word to be highlighted when found
  - Interface: Driver
    - Interface to permit the framework to check the spelling of and provide UI feedback for different text component implementations

Java Spelling Framework UI Events

- Bean com.apple.spell.ui.SpellingPanel
  - Event: Ignore
    - Fired by the SpellingPanel when the user clicks the Ignore button and indicates what word is being ignored
  - Event: FindNext
    - Fired by the SpellingPanel when the user clicks the Find Next button as well as after the Ignore event was fired
  - Event: Correct
    - Fired by the SpellingPanel when the user clicks the Correct button and includes what Word was being corrected and what the correction is
  - Event: Found
    - Fired by the SpellingPanel when a misspelled word is found

Spell Checking DEMO



Get the Code!

Apple's Java Developer Website
http://developer.apple.com/java

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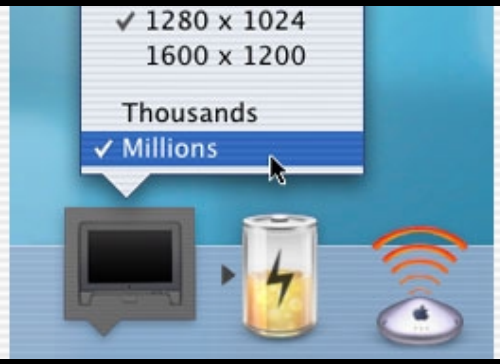
Q&A



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http://developer.apple.com/events/urls.html

WWDC

Worldwide Developers Conference 2001